REMARKS

Claims 1-9 are now pending in the application. The amendments to the claims contained herein are of equivalent scope as originally filed and, thus, are not a narrowing amendment. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

Features of the present application

The Examiner rejected claim 1 under 35 USC 102(b) as being anticipated by Shanks et al. (US2002/0152044), which anticipate a communication method of the present invention for a noncontact RF ID system that uses a first waveform, a second waveform, and a third waveform, wherein one of the rising timing and the falling timing of the waveform output becomes periodic, when communicating by using the first waveform, the second waveform and the third waveform.

The present application relates to a noncontact RF ID system comprises a reader and a plurality of IC tags as transponders for remote ID recognition of these IC tags without directly contacting the reader. The IC tags are provided with a receiving function and a transmitting function, and in general, a reader of the noncontact RF ID system transmits a code sequence, that include data information and clocks, to a plurality of IC tags (receivers), and when the code sequence is received by an IC tag, the IC tag recognizes the content of communication and return necessary information to the reader.

The noncontact RF ID system of the present application comprises, as shown in Fig. 1, a reader 1 and a plurality of transponders 2. The transponder 2 comprises an antenna 2A, and a DC power detecting circuit 200, a signal detecting circuit 201, an input amplifier 202, a clock generating circuit and a demodulator 300, that do not require a phase locked loop and a reference circuit, a control logic circuit 204, and a memory 205. In addition, when the transponder 2 responds to the reader 1, the response is carried out by turning the FET switch Q1 ON and OFF, and modulating the impedance of the antenna 2A by using the load capacitor C2.

The features of the present noncontact RF ID system are to use data information comprising a first waveform, a second waveform and a third waveform. The waveform A and

waveform B, shown in Fig. 2A, are set as the first waveform and the second form are assigned as codes of "0" and 1", for example, and the first and second waveforms have rising or falling state transitions at approximate center part of each waveform, which indicates that the duty ratio of these waveforms are 50%, respectively. The waveforms shown in Figs. 2 to 8 are waveforms used as the third waveform in place of n pieces of successive waveforms B, for example, and the third waveform has periodic state transitions arranged at approximate center parts of respective basic waveforms, also indicating that the duty ratio of the third waveform is also 50%.

When the first waveform is assigned as "0", and the second waveform is assigned as "1", and the third waveform C(3) shown in Fig. 2B, for example, representing that there are two (2n=2) successive codes of (1), the data information formed by a first waveform A, a second waveform B, a first waveform A, a third waveform C(2), and a first waveform represents a code sequence of 0, 1, 0, 1,1, 0.

As described above, when the first waveform, the second waveform, and the third waveform shown in Fig. 2B are used for communication, since the state transitions are always generated at each center point of the basic waveforms, and it is possible to associate a rising timing (in this case) with a unit of data, the code length can be reduced to a half of the conventional code length. Furthermore, the present invention provides an improved transmission efficiency without using a plurality of phase locked loops and reference circuits.

The Shanks Reference

A method, system and apparatus for a timing subsystem in a radio frequency identification tag device are disclosed. The timing subsystem provides a system oscillator or clock for a tag, and also provides frequencies used by an RF interface to the tag to generate backscatter modulated symbols. The timing subsystem also provides for oscillator calibration. The tab receives one or more oscillator calibration waveform transmitted by the reader. The timing subsystem in the tag uses the oscillator calibration waveforms to successively adjust the frequency of the tag oscillator to a frequency desired by the reader. Hence, the reader may increase or decrease the oscillator frequency in the tag depending on the particular application.

As shown in Figs. 3, 4 and 5, the reader transmits three types of waveforms that indicate a logical "0", a logical "1", and a logical "null", respectively. When transmitting a logical "0" symbol, the reader network maintains its carrier signal amplitude at S_{low} for a time duration of T_A of $3\mu s$ in a total cycle time of $12.5\mu s$ ($3/12.5\mu s$), forming the first waveform as shown in Fig. 3. When transmitting the logical "1" symbol, the reader network maintains the carrier amplitude at S_{low} for a time duration of T_B ($6/12.5\mu s$), forming the second waveform as shown in Fig. 4. When transmitting the logical "null" symbol, the reader maintains the carrier amplitude at S_{low} for a time duration of T ($9.5/12.5\mu s$), forming the third waveform. The Shanks reference forms the first, second and third waveforms by changing the duty ratio in a fixed cycle time. Therefore, the waveforms disclosed in the Shanks reference differs from the waveforms used in the present application, because the present application uses waveforms each having a duty ratio of 50%, in contrast to waveforms of the Shanks reference, in which each waveform has a different duty ratio.

The Tanaka references

The Tanaka references disclose a code system in which a waveform A and a waveform B each have a duty ratio of 50% in which only any one of a rising edge or a falling edge is present, are combined with each other and "1" and "0" are assigned to respective waveforms.

The Tanaka reference does not disclose the third waveform of the present invention. The present invention comprises the first, second and third waveforms, wherein the third waveform is constructed for replacing successive waveforms of the first waveform or the second waveform. In the present application, the waveforms A and B are configured so as to generate a state transition only at approximate center part of a cycle time. If the state transition occurs at a part other than approximate center part when a signal sequence is constituted, the third waveform is used so as to form a code sequence in that each state transition only occurs at approximate center part of the waveform sequence.

REJECTION UNDER 35 U.S.C. § 112

Claims 8-9 stand rejected under 35 U.S.C. § 112, first paragraph, as based on a means recitation does not appear in combination with another recited element of means. This rejection is respectfully traversed.

1. In response to the Examiner's rejection of claims 8 and 9 under 35 U.S.C. 112 as not fulfilling enablement requirement, claims 7, 8 and 9 are amended in order to clearly recite every element of the noncontact RF ID system of the present application.

The features of the present application are to use a noncontact RF ID system comprising a reader and a transponder in order to communicate data information between the reader and the transponder, and data information is consisted of the first waveform, the second waveform and the third waveform. Since claims 7, 8 and 9 originally discloses elements of the noncontact RF ID system, these claims, and particularly claim 7, are amended by addition of constituting elements of the noncontact RF ID system of the present application. The Applicant's respectfully request that the Examiner withdraw rejection of claims 8 and 9.

2. The Examiner rejected claims 1-7 under 35 U.S.C. 101 because the claimed recitation for use of noncontact RF ID system, without any active, positive steps involved in the process, results in an improper definition of a process.

In response, the Applicants added a new claim 10, which recites the steps of transmitting and receiving data information comprising a first waveform, a second waveform, and a third waveform. The Applicants respectfully request that the Examiner withdraw the rejection of claims 1-7.

3. In response to the rejection of claims 1, 2, 8 and 9 because the term "waveform" does not include sufficient antecedent basis, the Applicants have amended claims 1, 2, 8 and 9 by replacing the term "the waveform" with the term "a waveform".

4. In response to the rejection of claim 3 as including a term "the waveform" which has insufficient antecedent basis, the Applicants have amended claim 3 by replacing the term "the waveforms" with the term "waveforms".

5. In response to the rejection of claims 4-5 because some terms do not include sufficient antecedent basis, claims 4 and 5 are amended as underlined by replacing terms "the positive time direction", "the negative time direction", "the starting point", "the end point", "the center point", and "the point in time" with "a positive time direction", "a negative time direction", "a staring point", "an end point", "a center point", and "a point in time", respectively.

REJECTION UNDER 35 U.S.C. § 102

Claims 1 and 7 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Shanks et al. (US2002/0152044). This rejection is respectfully traversed.

The noncontact RF ID system of the present application comprises a reader, and a transponder 2 comprising an antenna 2A for receiving the signal from a reader 1, a DC power detecting circuit 200, a signal detecting circuit 201, an input amplifier 202, and a clock generating circuit and a demodulator 300, a control logic circuit 204, and a memory 205. The feature of the present invention is to carry out communication between the reader 1 and the transponder 2 by use of data information comprising a code sequence formed by the first waveform, the second waveform and the third waveform, each of which has the duty ratio of 50%, thereby, state transitions of respective basic waveforms become periodic, indicating that the state transitions of respective basic waveforms are generated by regular intervals. In addition, since the third waveform is formed so as to replace successive waveforms such that the state transitions will not be generated at an outside of the center part of the cycle time.

Accordingly, the present noncontact RF ID system does not need to provide a plurality of phase lock loops and reference circuits. In addition, as shown in Fig. 9A and 9B, the length of a code length can be reduced by half of the code length when the code sequence is formed by a conventional communication method.

In contrast, although the Shanks reference also discloses to form a code sequence by use of a first, second and third waveforms for communication, these waveforms are

formed by changing the duty ratio of respective waveforms. Therefore, the first, second and third waveforms have duty ratio differing each other, so that timings of the state transitions are not periodic. Accordingly, it is necessary for the noncontact RF ID system of the Shanks reference to provide a plurality of phase lock loops and reference for identification of different waveforms. In addition, the code length will not be reduced without using the third waveform of the present invention.

REJECTION UNDER 35 U.S.C. § 103

Claims 2-6 and 8-9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shanks et al. (US2002/0152044). This rejection is respectfully traversed.

As shown on page 24, line 18 to page 25, line 18 of the present specification, a first waveform and a second waveform are formed by basic waveforms having one of rising or falling state transitions at the approximate center part of the basic waveform, and a third waveform is formed by a plurality of basic waveforms having one state transition at approximate center part of the waveforms. A state transition in the third waveform is generated only at approximate center part of the plurality of basic waveforms.

When communication is carried out by using the first waveform and the second waveform, in the case in which one state transition is generated outside of the approximate center part of the waveform (for example, the case of successive second waveforms), transmission is carried out by assigning the third waveform that does not generate a rising (or falling) state transition at the junction between two basic waveforms on the transmission side in place of the successive second waveforms, and at the reception side, when the third waveform has been received, demodulation is carried out by recognizing the reception of the successive second waveforms.

Therefore, it is possible to assign the first waveform and the second waveform separately to codes “0” and “1”, and to assign the third waveform as successive codes of “1”, and it is possible to accord a rising (or falling) timing with a unit of data, it is possible to reduce by half the code length in comparison with the case using the another conventional

communication method, and improvement in transmission efficiency due to the encoding can be realized.

When using a circuit that detects a rising transition or falling transition, it is possible to generate easily a clock signal that is in synchronism with data. Therefore, if the state transition generated at equal intervals is used as a trigger, it is possible to obtain easily a clock that is in synchronism with data without using a phase locked loop.

According to the present invention, improvement in the transmission efficiency due to encoding can be realized without using a plurality of phase locked loops and reference circuits, and it is possible to realize a communication method for noncontact RF ID system and a transmitter and receiver. The use of the third waveforms in place of the successive first or second waveforms is neither disclosed nor suggested by the Shanks reference.

As described above, the reader of Shanks reference uses a first waveform shown in Fig. 3, a second waveform shown in Fig. 4, and a third waveform shown in Fig. 5, representing code of "0", "1", and "Null", respectively. It is indicated that these waveforms are formed by changing duty ratios of respective waveforms, in contrast to the waveforms of the present application each having a fixed duty ratio of 50%.

The waveforms by the Shanks reference differ from the waveforms of the present application in which, when m pieces of successive identical waveforms exist in a code sequence, the M pieces of waveforms are replaced with a third waveform and the third waveform is inserted in the code sequence, thereby the rising or falling state transitions are generated at the approximate center parts of respective basic waveforms so that the state transitions are generated in a periodic manner.

The noncontact RF ID system of the Shanks reference requires to identify signal waveforms by providing a plurality of phase lock loops or reference circuits, so that the system of Shanks becomes quite complicated.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 08-0750, under Order No. 5259-000043/US/NP from which the undersigned is authorized to draw.

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Respectfully submitted,

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